Deployable DNS

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Organization: W114
Project: 0701A340-AT

MITRE

Agenda

- Background
- Task
- General Approach
- Domain Stability
- Address Space
- DNS Products
- Network Address Translation (NAT)
- Current Recommendation
- Where we are going

FY 00 Situation

- Existing SBU user community deployment senario
  - Address space provided ad-hoc by JTF/Theater/Unit
    - May include using sustaining base address space
  - JTF/Exercise assigned unique domain names
- Army stands up Window 2000 working group
- GCSS-A was scheduled to field a large Microsoft Windows 2000 infrastructure
  - Requires stable domain name
- Address space to support the deployed SBU user community
  - Plans to use SIPRNET address space were rejected
  - No standardized approach
- PEO C3S was not tasked to provide SBU solution until FY '04

Task

- Develop a proposal to resolve the current lack of DNS support the PEO STAMIS user community
  - Schedule permitting, develop a prototype of the recommended solution
- Three primary programs identified as essential GCSS-A, MC4, and SIDPERS-3 (AHRS)
  - Scope increased to include other systems

General Approach

- IP Address space was the most critical resource associated with the task, and was designated the primary driver for all recommendations
  - Each computer has to have an address to be on the network
- Six addressing schemes considered
  - Public IPv4 Class B network
  - Public IPv4 Class C network
  - Public IPv6 network
  - Private IPv6 network
  - Shared address space (garrison & Signal Center)
  - Private IPv4 network - Still working this approach
- Collect System Information
- Review candidate DNS solutions
- Finalize recommendations
- Present final recommendations

Domain Stability

- Windows 2000 and PKI (device certificates) require stable domain name
- Control of name and address space by deployable units
  - Discussing the control of DNS name and address space with ASC, generally receptive to unit control
  - Currently each deployable unit's name and address space is managed differently
  - Units must assume control of their DNS data
    - Assumption of control can be labor and time intensive process
  - MITRE is investigating the feasibility of including the deployable units in Army's DNS architecture similarly to the method used to include separate theaters now

Address Space

- Army Domain Manager issued Signal Center a class B network
  - Support the deployable SBU address space requirement
- Signal Center is currently allocating 16 class C sub-networks directly to each Corp and several MACOMs
  - Corps and MACOM distribute address space at their own discretion
  - Does not guarantee the deployable units specific amounts of address space
  - Signal Center is working with units to resolve issues
- Supported a Signal Center request to participate in a discussion on tactical address space and DNS services on 30-31 July

DNS Products Evaluated

- Scope of the implementation is restricted to the size of the deployable unit
  - Corp HQ & Corps support elements
  - Division
  - Separate brigades
- Nortel Networks - NetID
  - Rejected vender phasing out the product
- Lucent QIP - Commercial version
  - Viewed requirements to field product differently than PEO C3S
  - Rejected as not suitable for the task
    - Data replication was not supported within the product
    - User interface very difficult to use and understand
- Windows 2000 DNS using Active Directory
  - Installing and performing initial tests

Network Address Translation (NAT)

- Used to translate private un-routable IPv4 address space to routable IPv4 address space
- Application Level Gateways are used to proxy applications that transmit network specific information through connections

NAT Benefits

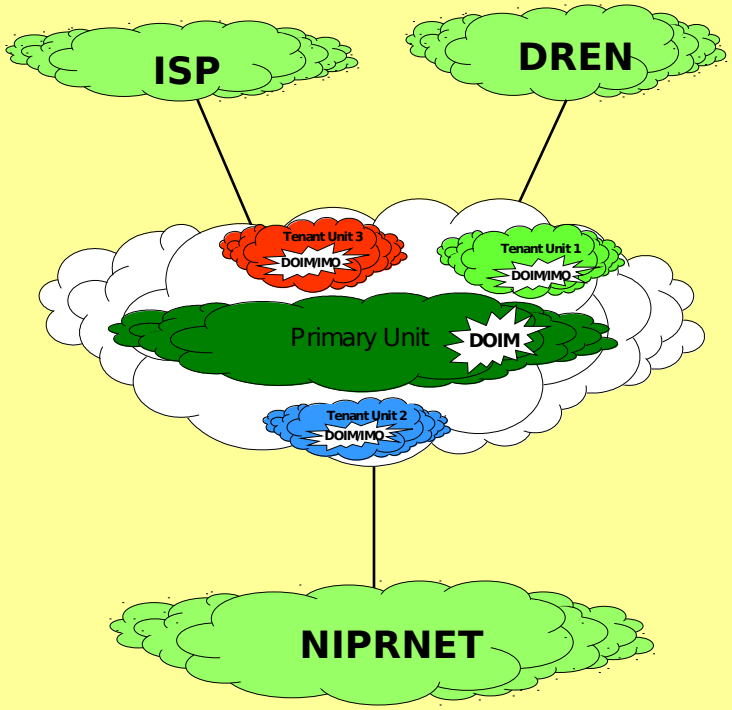
- Optimizes the utilization of public or routable IP address space
  - Sun claims one Class C network can support a well populated Class B network
- Enhances network security posture
  - Requires a closed enclave with well defined entry/exit points
  - Enclave is less susceptible to probing and follow-up attacks when few or no static mappings exist between the public and private enclaves

NAT Problems

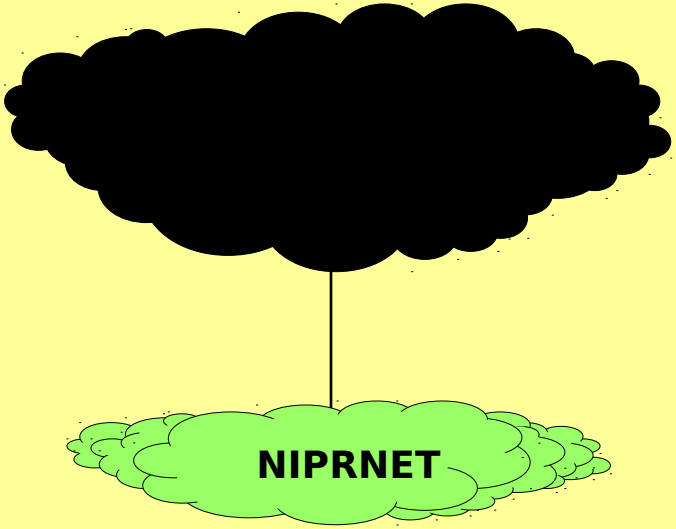
- Enclave hosts that must be known outside the enclave, must be statically mapped at the the NAT Server
  - Static mapping are manually created in most NAT servers
  - Efficiency of address space utilization decreases as the number of static mappings increase
- Two DNS systems must be maintained and synchronized
  - Public DNS is publicly accessible, contains references to only public or routable address space
  - Private DNS is only accessible from within the private enclave, may contain references to both public and private address space
- Enclave manager loses the ability to easily discriminate on an individual host basis, outside the enclave
  - NAT server allocation logs must be reviewed to determine which internal host was mapped to which external address at any given point

Enclave Types

- Public



- Private



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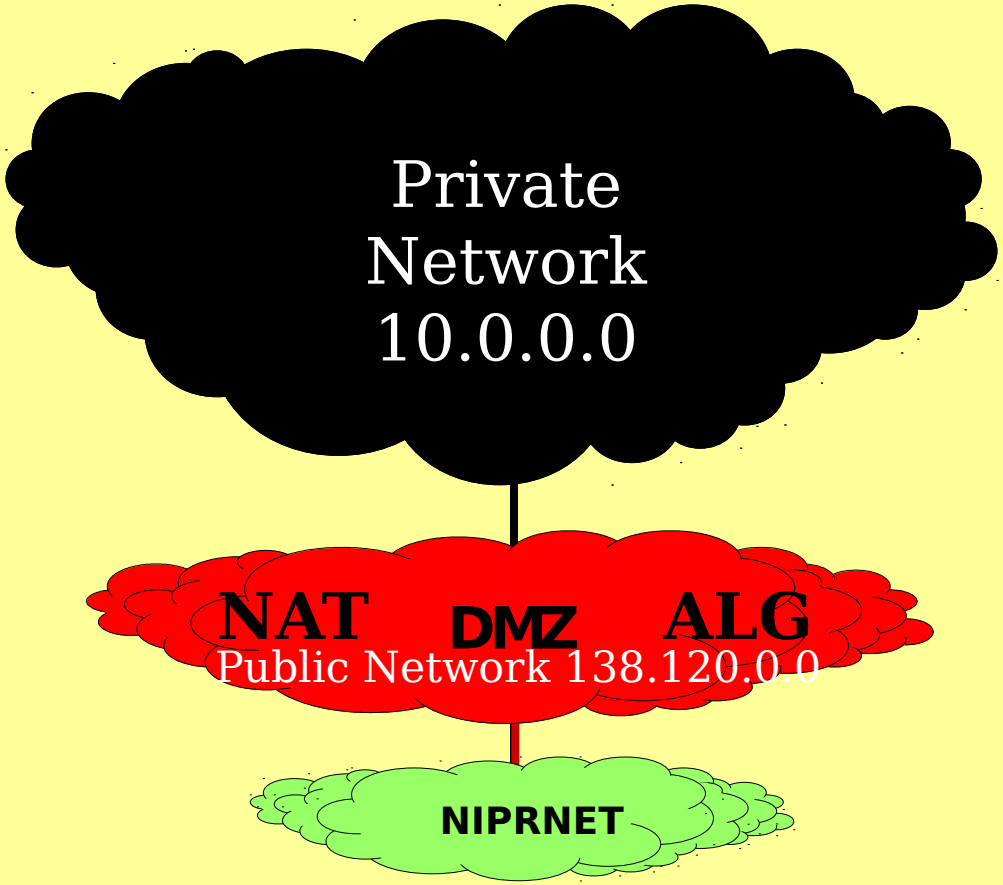
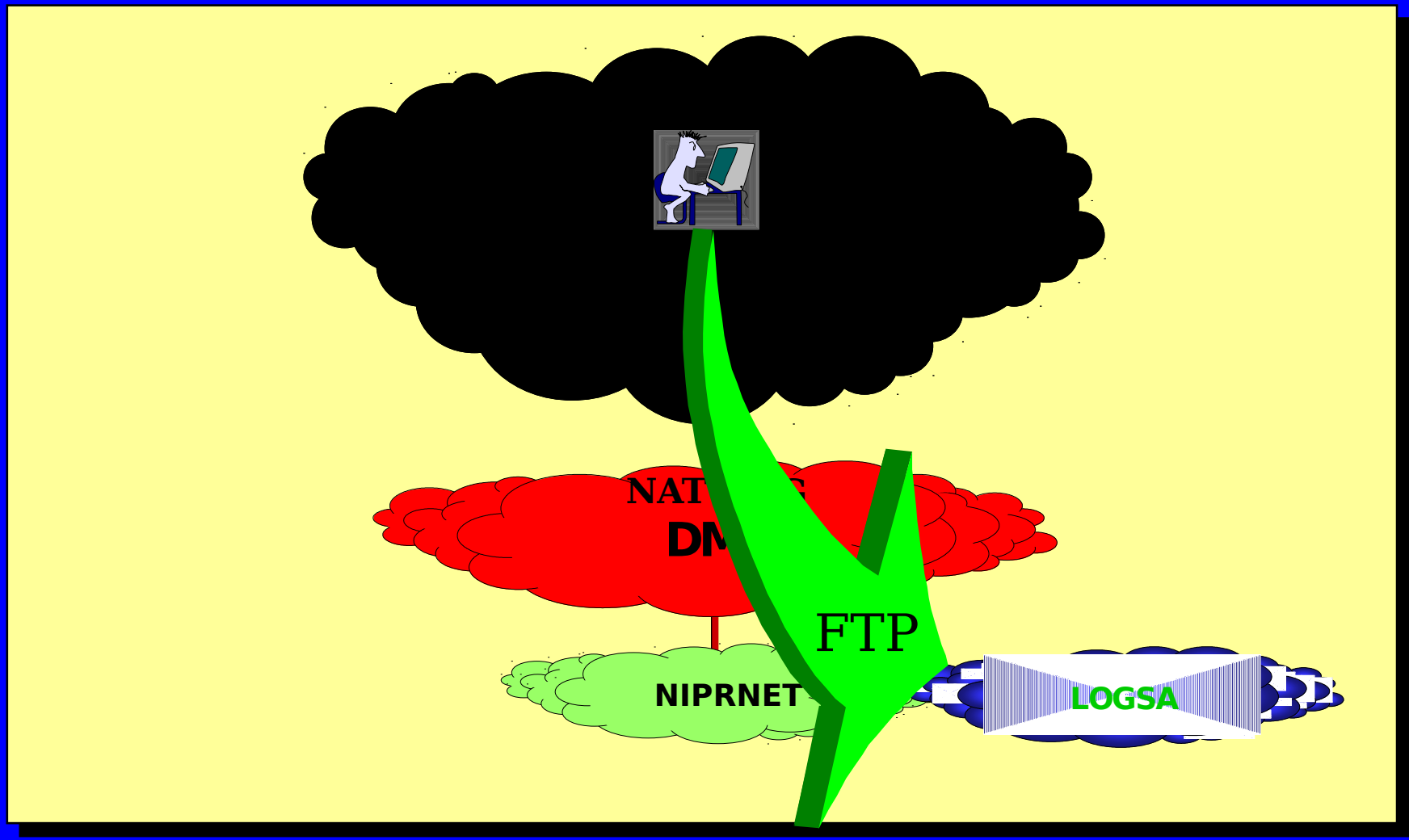
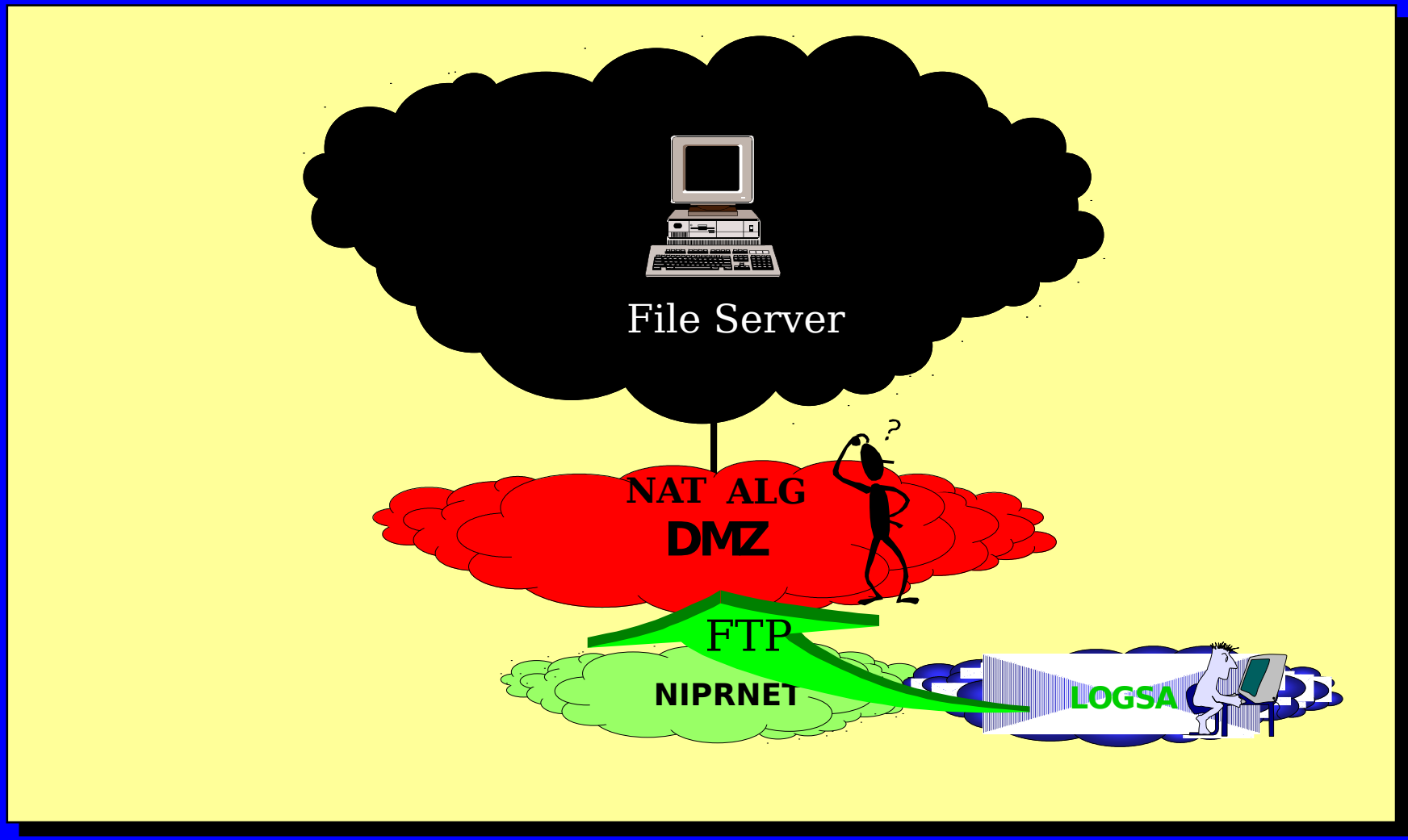
Private Enclave



Users Inside Private Enclaves



External Users Accessing Private Enclaves



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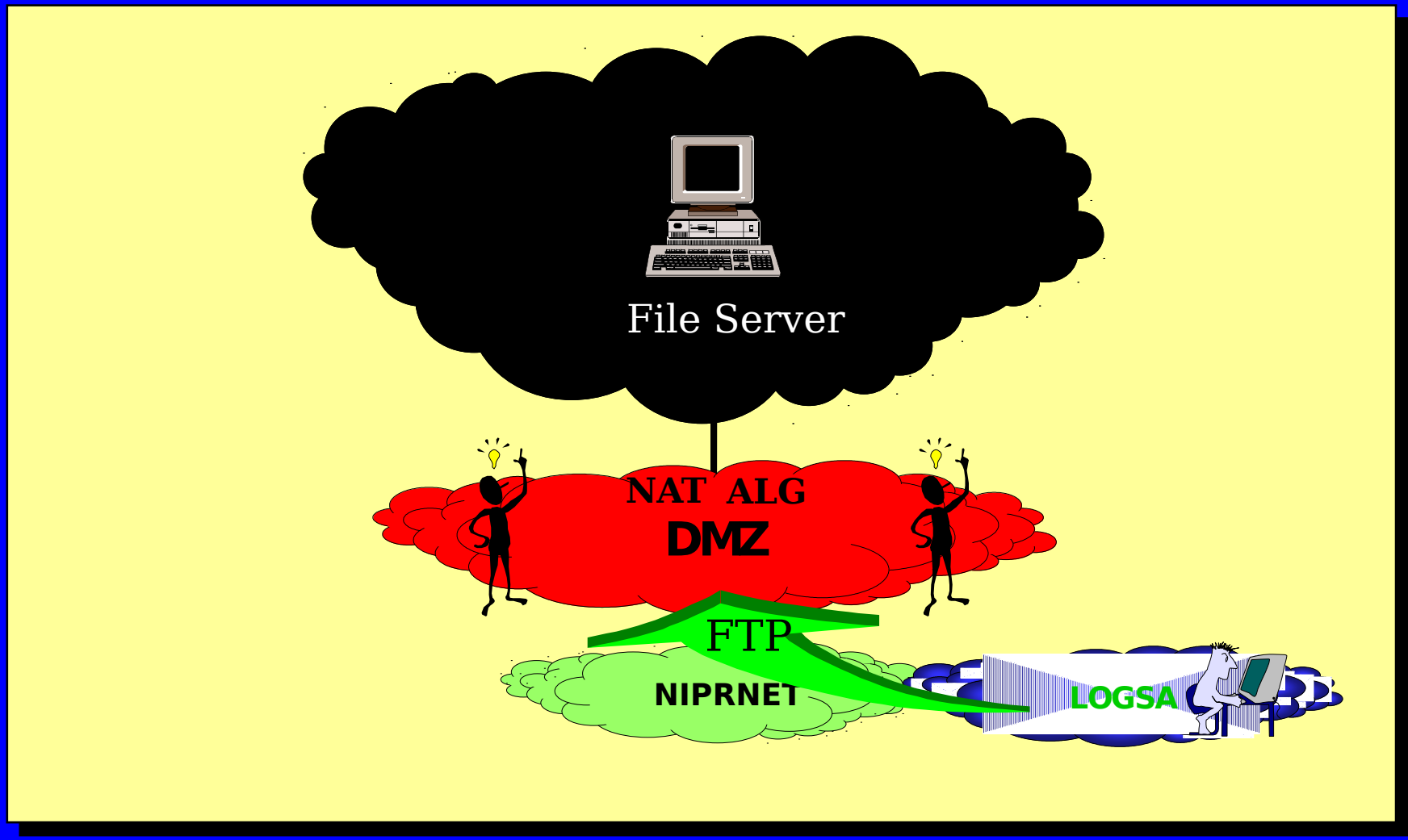
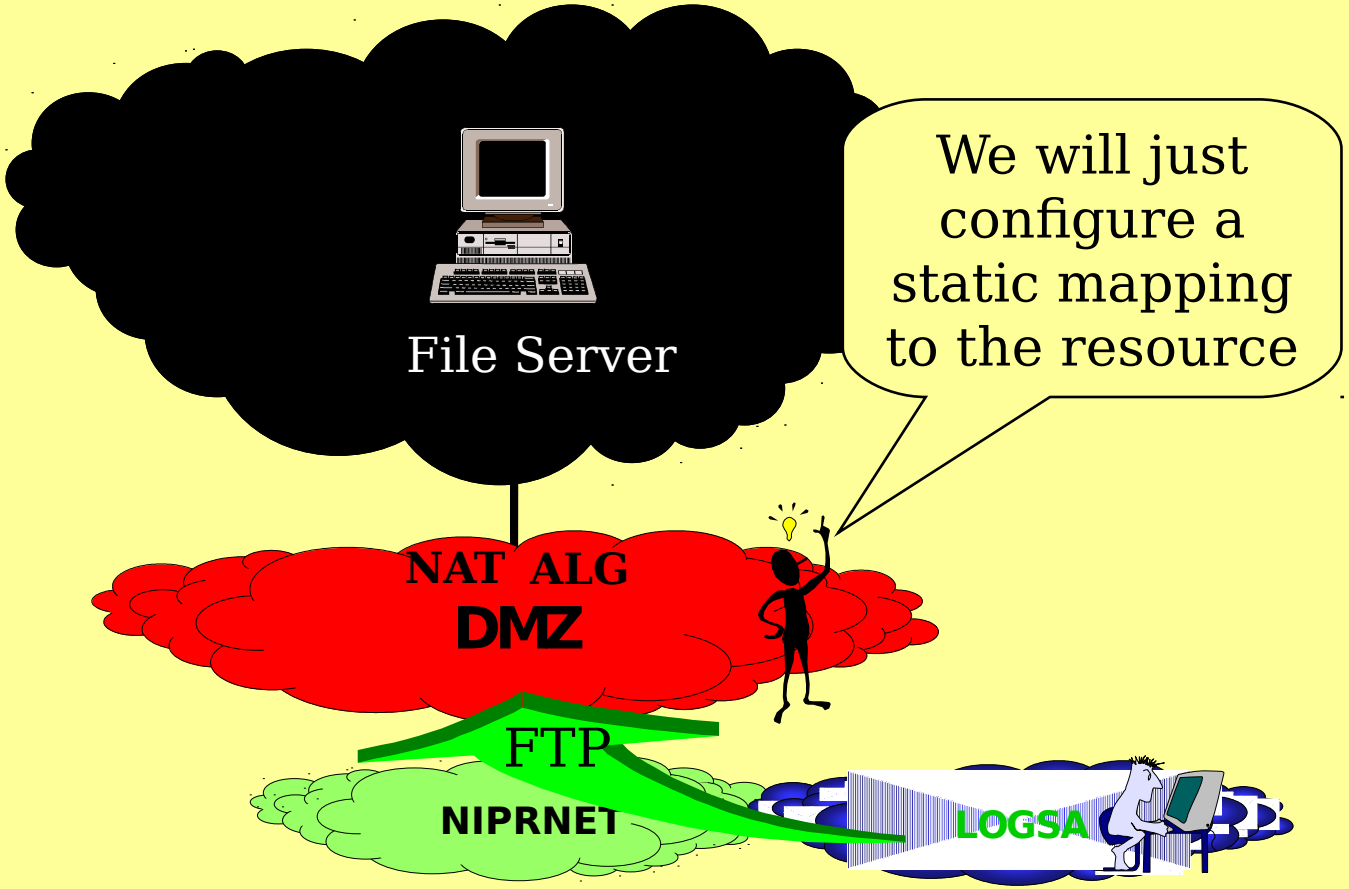
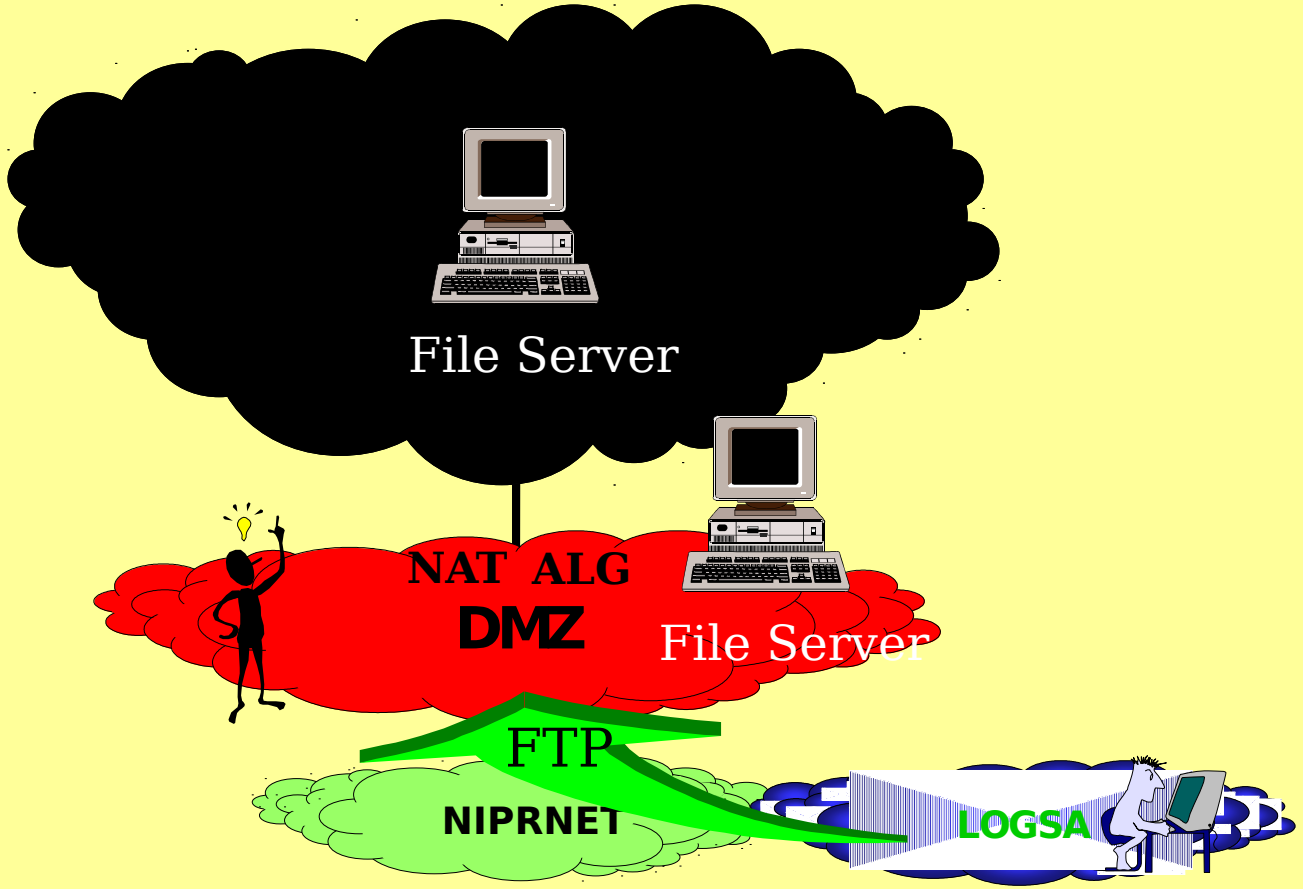


External Users Accessing Private Enclaves
Resources Inside the Enclave



External Users Accessing Private Enclaves
Resources in the DMZ



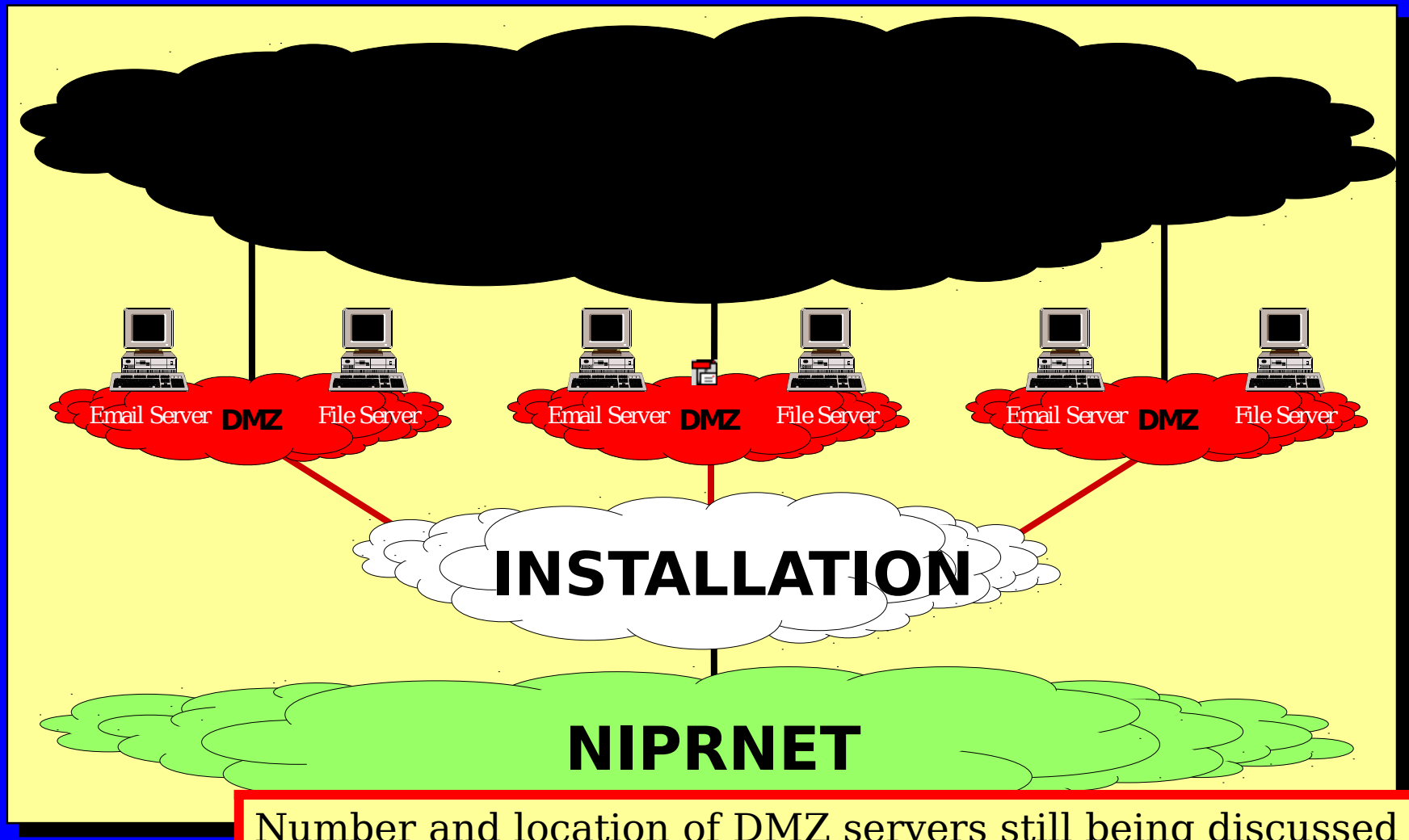
Open NAT Issues

- PKI implementations
  - Certificates for network devices contain the fully qualified domain name of the device
  - Are private devices required to have public certificates?
  - How will this affect user certificates?
- TCP Wrappers
  - Host use TCP Wrappers to secure access to TCP base services
    - Access is defined by IP address or fully qualified domain name
  - Hosts coming from a NAT enclave will have a random IP address and associated fully qualified domain name
    - Static mapping could be used, but would reduce the address space utilization efficiency
  - Investigating the use of Secure Shell or PKI certificates to overcome this issue

Current Recommendations

- Provide additional services in the deployable DMZ/TAPP
  - FTP and SMTP are currently identified as the primary PEO STAMIS data transport protocols
  - Place public service points in the DMZ
    - FTP server, supporting FTP into the enclave
      - Users outside the enclave FTP their files to a designated location on the FTP server
      - Users inside the enclave pull the files off the FTP server
    - Email/SMTP server, supporting receipt and delivery of email
    - Web/HTTP server, potentially
  - Minimizes or eliminates need for static mapping

Current Conceptual Enclave - In Garrison



Number and location of DMZ servers still being discussed

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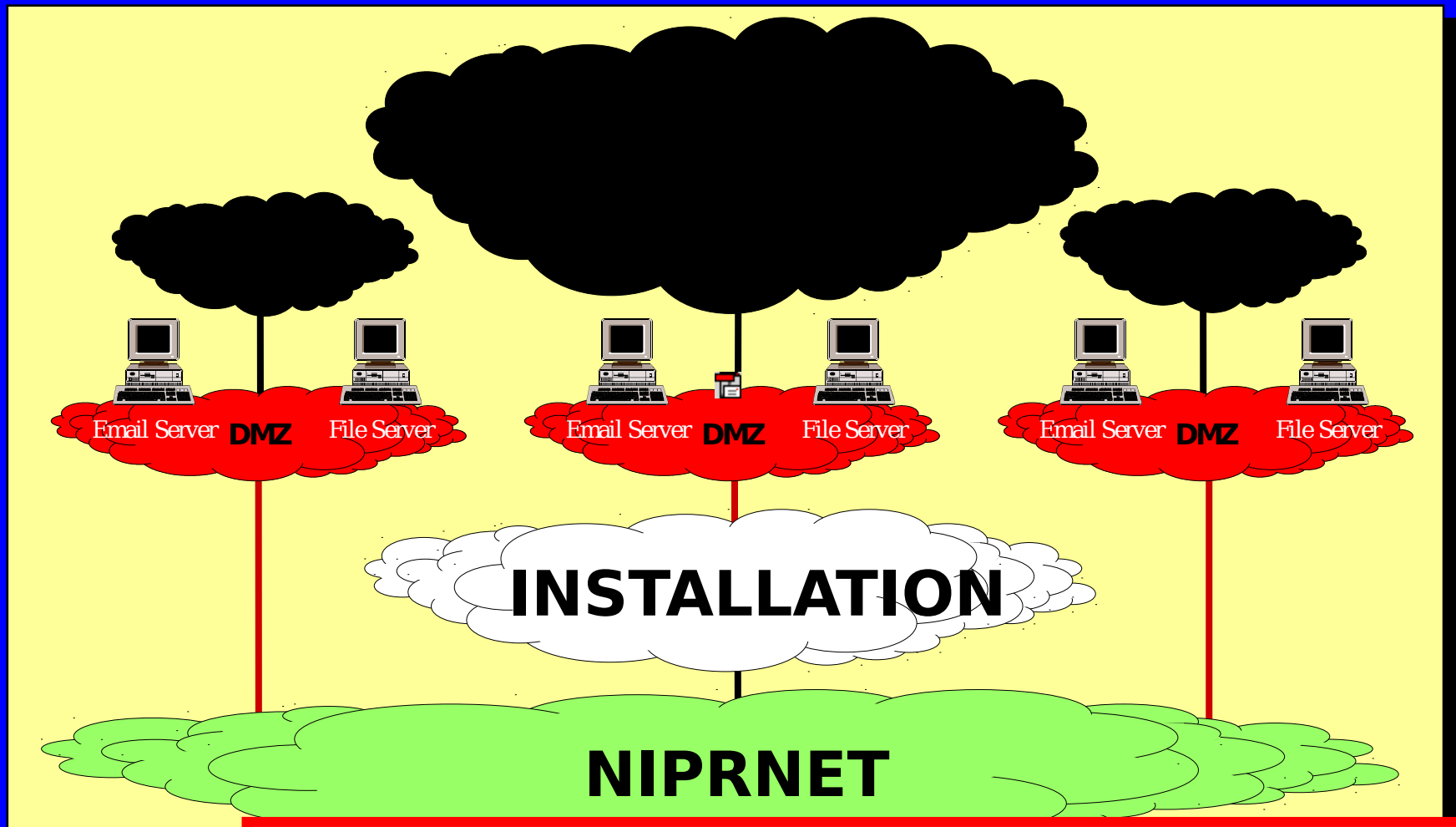
Current Conceptual Enclave - Deployed



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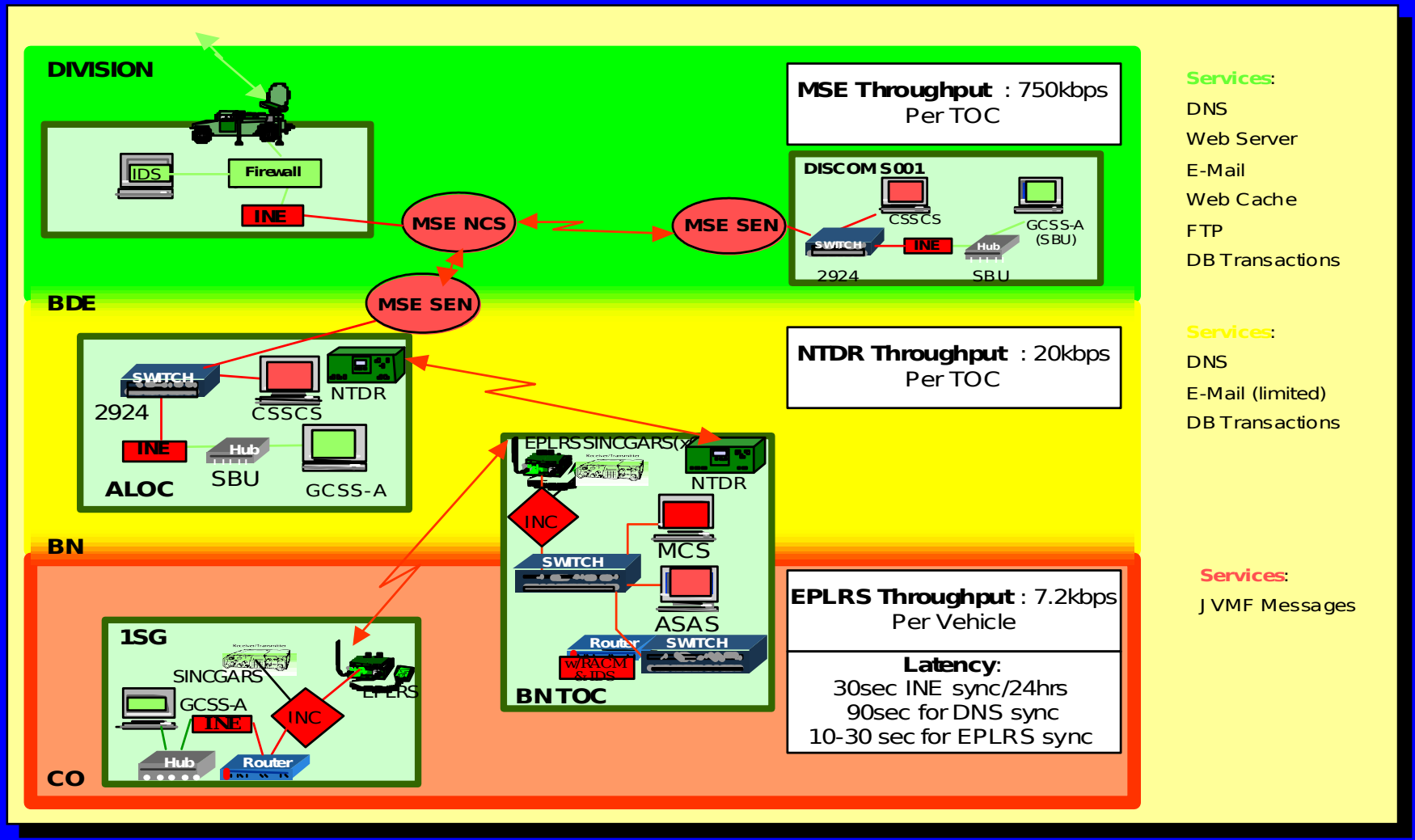
FDD Communications Infrastructure



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Where are we going

- We will complete our information collection
  - Require the information to ensure we understand the implications of our recommendations
- Complete coordination with other programs
  - PM WIN-T on TAPP
  - PM SET-D
  - PO CAISI
  - PM Directories & Windows 2000 Systems Engineers
  - PEO STAMIS - CIO
- Finalize IPM product recommendations
  - Final IPM test configuration will be a prototype of the recommended IPM configuration
    - Hardware variations may need to be taken into consideration

Questions

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